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Role of CHP in Meeting EPA's Climate Leaders GHG Reduction Goals

What is Climate Leaders?

- Climate Leaders is a voluntary EPA industry-government partnership that encourages companies to develop long-term comprehensive climate change strategies
- Recognizes GHG emissions reductions
- Inventory protocol to track corporate GHG emissions and reductions
- Key Component of The Administration's Climate Plan

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Becoming a Climate Leaders Partner Is Simple

Partners agree to:

- Complete an annual GHG Inventory - including direct (e.g., on-site fuel use) and indirect purchased electricity
- Set 5 - 10 year emissions reduction goal that's aggressive for your sector - based off recent base year, can be normalized or absolute

EPA provides:

- Opportunities for high-level public recognition
- Technical assistance
- A credible, transparent GHG reporting mechanism

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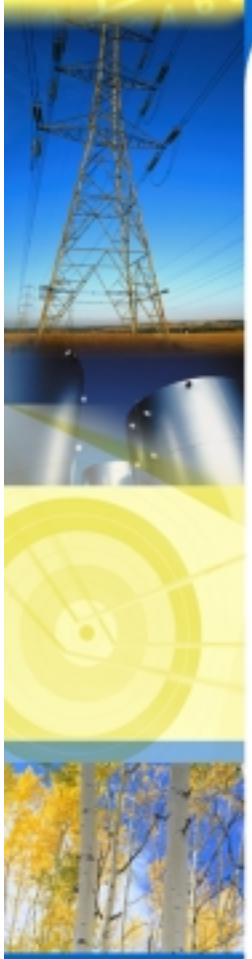
Partner Commitments

9 Climate Leaders Partners have set reduction goals

- Miller Brewing pledged to reduce emissions in 2001 by 18% per barrel of production by 2006
- General Motors pledged to reduce total emissions in 2000 by 10% for all of their North American facilities by 2005
- Holcim pledged to reduce emissions in 2000 by 12% per ton of cement by 2008



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EPA's Climate Change Umbrella Program

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Example 1: CHP Replacing Old System

- Base year situation
  - 80% efficient coal boiler - 180 MMBTU coal input
  - 145 MMBTU steam output
  - Purchased electricity - 30 MWh
- New replacement CHP system
  - Natural gas turbine and heat recovery steam generator
  - 345 MMBTU natural gas input
  - 145 MMBTU steam output
  - 30 MWh electricity output

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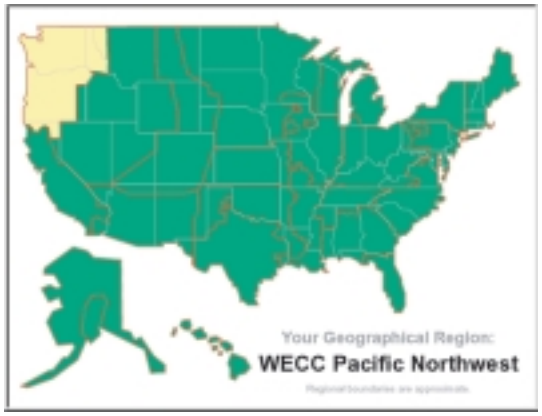
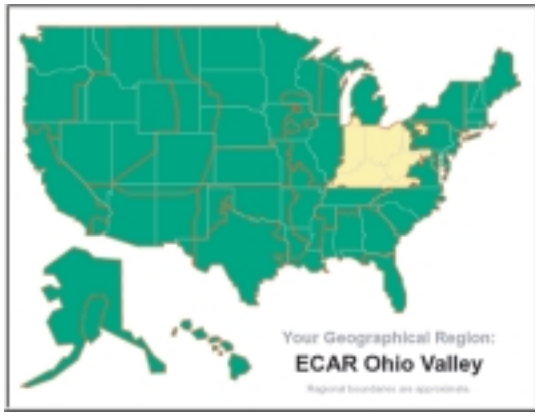
Example 1: Estimating Emissions

- Direct emissions from on-site fuel use:
  - Coal: 93 kg CO2/MMBTU
  - Natural gas: 53 kg CO2/MMBTU
- Indirect electricity emissions depend on region of the country - 27 regions specified



333 kg CO2/MWh



893 kg CO2/MWh

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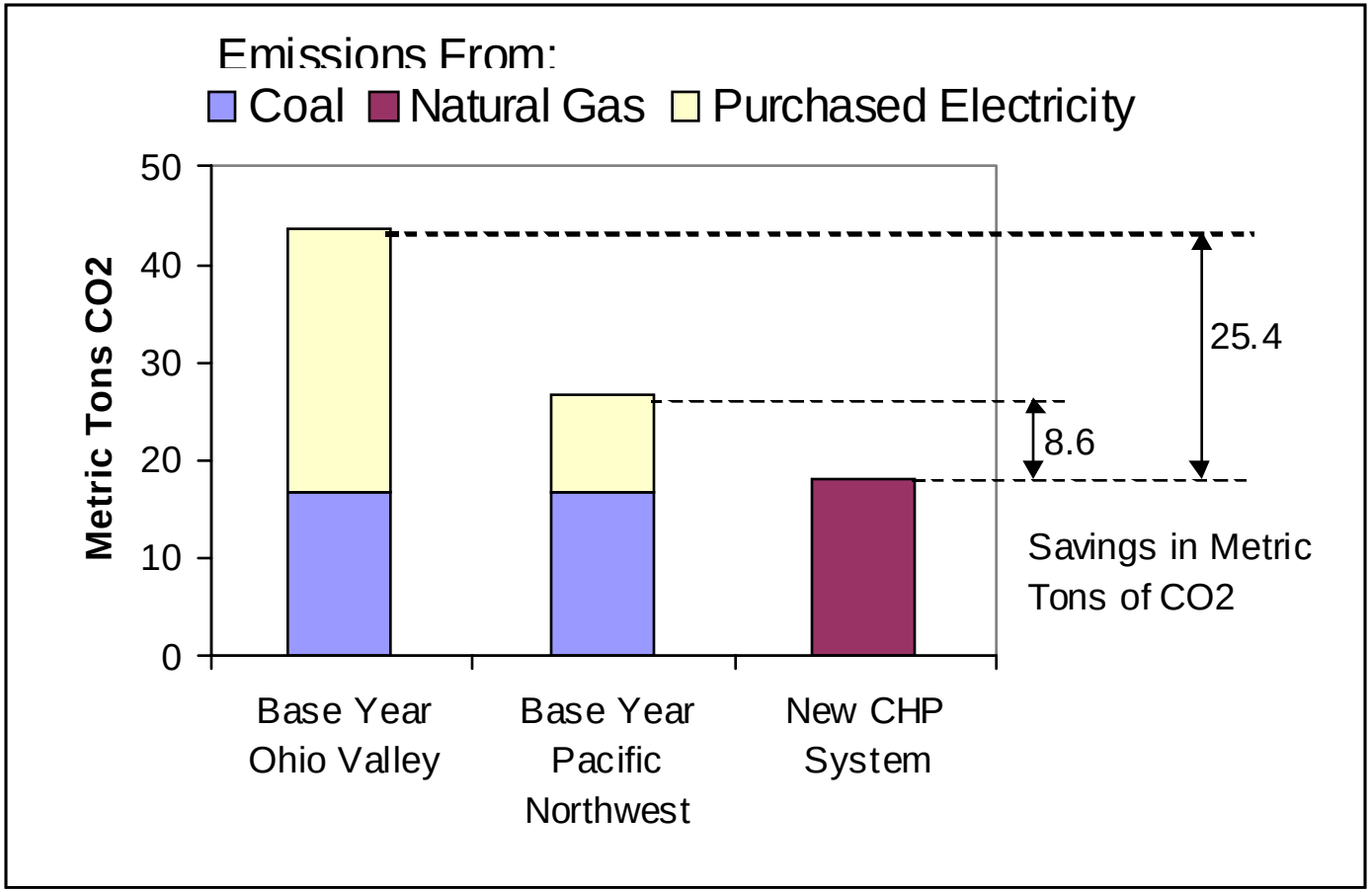
Example 1: Emissions Comparison



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Example 2: CHP to Meet Growth

- Base year situation
  - 85% efficient natural gas boiler - 1700 MMBTU input
  - 1,445 MMBTU steam output
  - Purchased electricity - 1,000 MWh
  - Plant output - 100 tons product
- Base year emissions
  - Natural gas use plus purchased electricity
  - 2,058 metric tons CO2 (Ohio Valley emission rate)
  - 20.6 metric tons CO2/ton product
- Growth scenario - 10% increase in output

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Example 2: Conventional Option

- Option 1: Conventional
  - New boiler and purchased electricity - additional 170 MMBTU natural gas use plus 100 MWh purchased electricity
  - 85% efficient natural gas boilers - 1,870 MMBTU input
  - Purchased electricity - 1,100 MWh
- Option 1 emissions
  - Natural gas use plus purchased electricity
  - 2,267 metric tons CO2 (Ohio Valley emission rate)
  - 20.6 metric tons CO2/ton product

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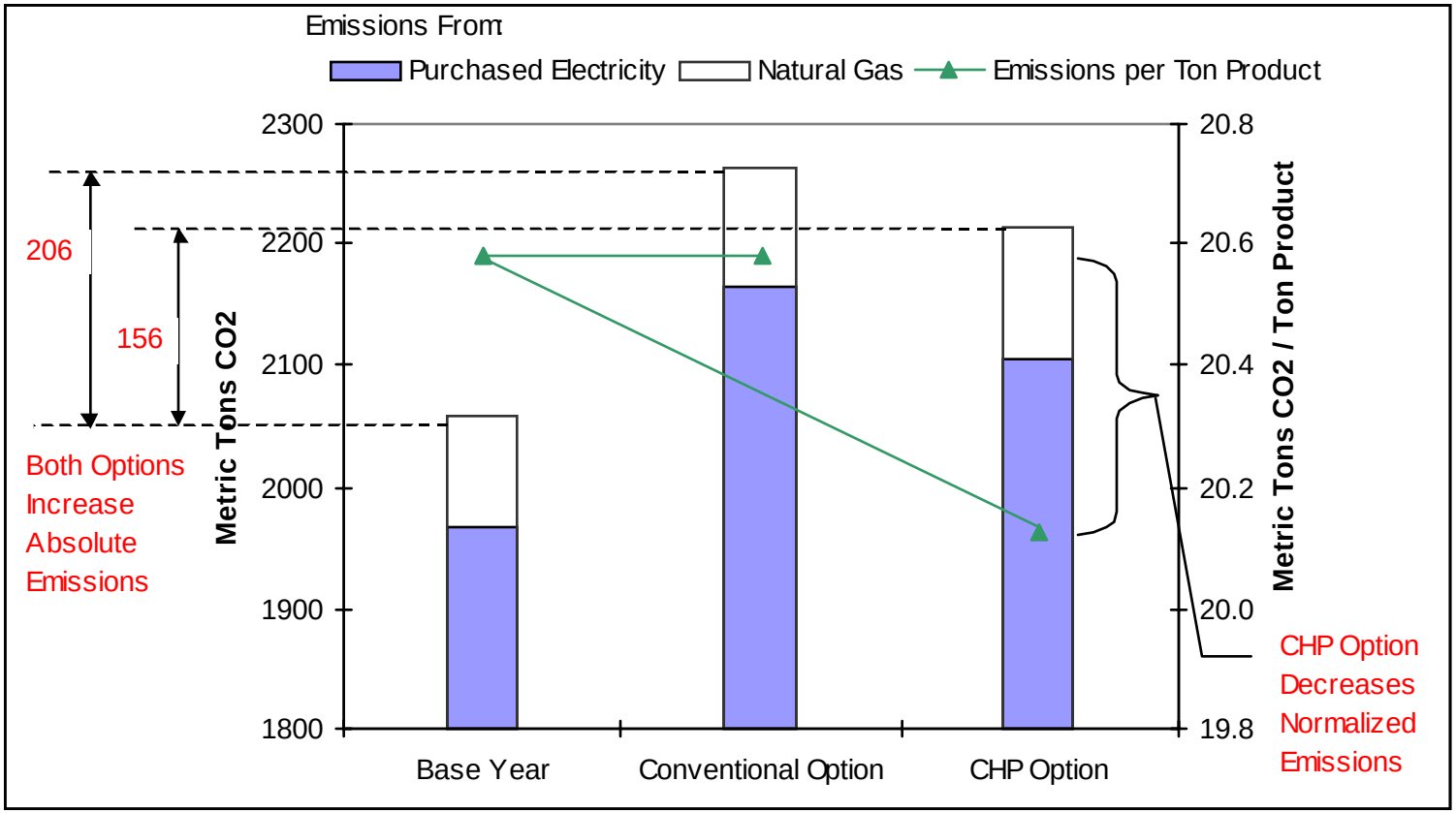
Example 2: CHP Option

- Option 2: CHP
  - Natural gas turbine and heat recovery steam generator - additional 345 MMBTU of natural gas use plus 70 MWh purchased electricity
  - Natural gas boiler + turbine - 2,045 MMBTU input
  - Purchased electricity - 1,070 MWh
- Option 2 emissions
  - Natural gas use plus purchased electricity
  - 2,214 metric tons CO2 (Ohio Valley emission rate)
  - 20.1 metric tons CO2/ton product

Example 2: Emissions Comparison



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Conclusions

- CHP can help to meet Climate Leaders (and other) GHG reduction goals
  - For replacement and for new growth
  - Absolute and normalized emissions
- Some considerations
  - Electricity grid region
  - Ownership of emissions

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